

Customer No.: 31561
Application No.: 10/709,055
Docket No.: 12404-US-PA

REMARKS

Present Status of the Application

The Office Action rejected claims 1-5 and 12 under 35 U.S.C. 102(b), as being anticipated by Yamazaki et al. (U.S. 2002/0004292). The Office Action also rejected claims 6-11 and 13-17 under 35 U.S.C. 103(a) as being unpatentable over Yamazaki in view of Jung (U.S. 6,825,493).

No claim is amended, claims 1-17 remain pending in the present application, and reconsideration of those claims is respectfully requested.

The undersigned would like to thank Examiner Elve for granting a telephonic interview on 2006/04/06, during which the 102 and 103 rejections were discussed. More particularly, the undersigned and the Examiner discussed the teachings of Yamakzaki. Emphases were again made that the island semiconductor layers 704 and the resist masks 721a to 721e of Yamakzaki could not be considered as comparable to the photomask of the instant case since these elements would not enable a passage of a portion of a light source and a shielding of another portion of the light source is discussed. In particular, even though with the teachings of a photomask by Yamakzaki in paragraphs [113], [118], [119], [128], [129] as argued by the Examiner during the interview, the photomask failed to read on the photomask of the instant case because the photomask of Yamakzaki was used to form a resist mask. On the other hand, the photomasks of the present invention were used to configure on an optical path of the first and second laser beams, respectively and in front of the amorphous silicon film. Subsequent to these

Customer No.: 31561
Application No.: 10/709,055
Docket No.: 12404-US-PA

explanations, the Examiner indicated that she would reconsider our arguments and the prior art reference.

Claim rejections - 35 USC 102

Applicants respectfully traverse the 102(b) rejection of claims 1-5 and 12 because Yamazaki et al. (U.S. 2002/0004292) does not teach every element recited in these claims.

In order to properly anticipate Applicants' claimed invention under 35 U.S.C 102, each and every element of claim in issue must be found, "either expressly or inherently described, in a single prior art reference". "The identical invention must be shown in as complete details as is contained in the claim. Richardson v. Suzuki Motor Co., 868 F. 2d 1226, 1236, 9 USPQ2d 1913, 1920 (Fed. Cir. 1989)." The elements must be arranged as required by the claim, but this is not an ipsissimis verbis test, i.e., identity of terminology is not required. In re Bond, 910 F.2d 831, 15 USPQ2d 1566 (Fed. Cir. 1990). See M.P.E.P. 2131, 8th ed., 2001.

The present invention is in general related an apparatus for laser annealing an amorphous silicon film as claim 1 recites:

Claim 1. An apparatus for laser annealing an amorphous silicon film, said amorphous silicon film including a first region and a second region not overlapped with said first region, said apparatus comprising:

- a laser beam source module providing a laser beam;
- a beam splitter, disposed on a path of said laser beam, splitting said laser beam into a first laser beam and a second laser beam;

- a first photomask disposed on an optical path of said first laser beam and in front of said amorphous silicon film;* and

- a second photomask disposed an optical path of said second laser beam and in front of said amorphous silicon film;*

wherein said first laser beam is emitted to said first region, and said second laser beam is emitted to said amorphous silicon film in said second region after said amorphous silicon film in said first region is recrystallized.

Customer No.: 31561
Application No.: 10/709,055
Docket No.: 12404-US-PA

The office action pointed out the prior art (Figs. 7A-E) has disclosed multiple masks between the silicon substrate and the laser source. However, the apparatus of claim 1 comprises a first and second photomasks, which are essential elements of the apparatus, but not mask layers or patterns. As a matter of fact, no photomask is used in Figs. 7A-E of the Yamazaki's reference. As shown in Fig. 7B, the island semiconductor layers 704 to 708 are formed, and then crystallization process is performed onto such island semiconductor layers 704 to 708. Island semiconductor layers 709 to 713 are thus formed from crystalline silicon film as shown by Fig. 7B (see paragraphs [0093]-[0094]). The island semiconductor layers 704 to 708 are annealed by the laser, and thus these island semiconductor layers 704 to 708 can not be photomasks. In addition, as shown in Fig. 7D, resist masks 721a to 721e are formed to be a mask for forming a LDD region in the n-channel TFT (see paragraph [0102]). Therefore, the resist masks 721a to 721e are implantation masks but not photomasks. The term of "photomask" is a mask for a light source which is well known to the people skilled in the art. That is, a photomask enable a portion of the light source passing through the mask, while the other portion of the light source will be shielded by the photomask. In Figs. 7A-E of the citation, island semiconductor layers 704 to 708 and resist masks 721a to 721e are shown but they are not photomasks.

In addition, the office action also pointed out intended use has been continuously held not to be germane in determining the patentability of an apparatus. However, the first and second photomasks are essential elements of the apparatus of claim 1 but not intended use in the

Customer No.: 31561
Application No.: 10/709,055
Docket No.: 12404-US-PA

apparatus. Applicant respectfully submits the apparatus of claim 1 is not disclosed by the Yamazaki's reference because the prior art fails to disclose, teach or suggest the feature of a first photomask disposed on an optical path of the first laser beam and in front of the amorphous silicon film and a second photomask disposed an optical path of the second laser beam and in front of the amorphous silicon film.

The apparatus of the Yamazaki reference is as shown in Fig. 3, 5 or 6, the primary laser light and second laser light emit to the front of the amorphous layer and the back of the amorphous layer through several optical elements, such as lens array, reflectors and lens. But, the primary laser light and second laser light does not pass through any photomask. In other words, the first and second photomasks are not found in the apparatus disclosed by Yamazaki. Therefore, Yamazaki fails to teach or suggest each and every element of claim 1. In addition, in claim 1 of the present application, both the first and second laser beam emit to the front of the amorphous layer because the first and second photomasks are disposed in front of the amorphous silicon film. However, the primary laser light and the second laser light disclosed by Yamazaki respectively emit to the front of the amorphous layer and the back of the amorphous layer. The arrangement of the elements in Yamazaki's reference is different from that of claim 1.

For at least the foregoing reasons, Applicants respectfully submit that independent claim 1 patently defines over the prior art reference, and should be allowed. For at least the same reasons, dependent claims 2-5 and 12 patently define over the prior art as a matter of law, for at least the reason that these dependent claims contain all features of their independent claim.

Customer No.: 31561
Application No.: 10/709,055
Docket No.: 12404-US-PA

Claim rejections - 35 USC 103

The Office Action rejected claims 6-11 and 13-17 under 35 U.S.C. 103(a), as being unpatentable over Yamazaki et al. (U.S. 2002/0004292) in view of Jung (U.S. 6,825,493). Applicant respectfully traverses the rejections for at least the reasons set forth below.

To establish a prima facie case of obviousness under 35 U.S.C. 103(a), each of three requirements must be met. First, the reference or references, taken alone or combined, must teach or suggest each and every element in the claims. Second, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skilled in the art, to combine the references in a manner resulting in the claimed invention. Third, a reasonable expectation of success must exist. Moreover, each of the three requirements must "be found in the prior art, and not be based on applicant's disclosure." See M.P.E.P. 2143, 8th ed., February 2003.

Applicant respectfully submits that, as disclosed above, Yamazaki fails to teach or suggest each and every element of claim 1 from which claims 6-11 depend. June also fails to teach the feature of that a first and second photomasks are disposed in front of the amorphous silicon film, and the second laser beam is emitted to the amorphous silicon film in the second region after the amorphous silicon film in the first region is recrystallized. The two references combined do not teach each and every element in claim 1. Therefore, independent claim 1 is patentable over Yamazaki and Jung, and should be allowed. For at the least the same reasons, its dependent claims 6-11 are also patentable as a matter of law.

Customer No.: 31561
Application No.: 10/709,055
Docket No.: 12404-US-PA

In addition, the present application also provides a method for annealing an amorphous silicon film as claim 13 recites.

13. A method for annealing an amorphous silicon film, said amorphous silicon film including a first region and a second region not overlapped with said first region, said method comprising:

splitting a laser beam into a first laser beam and a second laser beam;
emitting said first laser beam to said first region of said amorphous silicon film; and
emitting said second laser beam to said second region of said amorphous silicon film, after said amorphous silicon film in said first region is recrystallized.

The subject matter of claim 13 is a method but not an apparatus. The feature of claim 13 comprises the step of emitting the second laser beam to the second region of the amorphous silicon film, after the amorphous silicon film in the first region is recrystallized. Applicant respectfully submits the feature is germane in determining the patentability of a method claim. In particular, both Yamazaki and Jung fail to teach or disclose the feature of emitting the second laser beam to the second region of the amorphous silicon film, after the amorphous silicon film in the first region is recrystallized. Yamazaki just discloses the primary laser light and the second laser light respectively emit to the front of the amorphous layer and the back of the amorphous layer, but Yamazaki does not teach or suggest the primary laser light and the second laser light emit to the amorphous at different time. Yamazaki also fails to teach that the second laser light emits to the amorphous layer after the amorphous layer is recrystallized by the primary laser light. Moreover, Jung just teaches using a photomask in the silicon crystallization process,

Customer No.: 31561
Application No.: 10/709,055
Docket No.: 12404-US-PA

but Jung does not teach emitting the second laser beam to the second region of the amorphous silicon film, after the amorphous silicon film in the first region is recrystallized.

Therefore, the two references combined do not teach or suggest each and every element in claim 13. Thus, a prima facie case of obviousness for claim 13 has not been established by the Office Action.

For at least the foregoing reasons, Applicant respectfully submits that independent claim 13 patently defines over the prior art references, and should be allowed. For at least the same reasons, dependent claims 14-17 patently define over the prior art as well.

Customer No.: 31561
Application No.: 10/709,055
Docket No.: 12404-US-PA

CONCLUSION

For at least the foregoing reasons, it is believed that the pending claims are in proper condition for allowance. If the Examiner believes that a telephone conference would expedite the examination of the above-identified patent application, the Examiner is invited to call the undersigned.

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Respectfully submitted,

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